



CLINICAL AND BIOCHEMICAL PROFILE OF URINARY TRACT INFECTION IN DIABETICS - A TERTIARY CARE CENTRE EXPERIENCE

General Medicine

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ABSTRACT

Introduction Patients with diabetes experience polyuria and glycosuria because of elevated blood sugar levels, which creates an environment that is conducive to the development of Urinary Tract Infections. Various factors including and not limited to Age, Sex, BMI, Blood Glucose Levels, Neuropathy etc contribute to development of UTI in diabetics. We aimed to study relationship between some of these factors and UTI in diabetics using clinical and bio chemical parameters. **Methodology** In this Single institute cross sectional study 250 diabetics with UTI who were admitted to a tertiary care centre were analysed for various clinical and biochemical parameters. Following informed consent all these patients were studied for Age, Gender, BMI, Blood glucose level, Renal Function and Urine analysis. All the findings were noted in a pro forma and quantitative analysis was done using appropriate tools. **Results** Out of 250 diabetics with UTI, majority had Type 2 DM (94%). Gender distribution was 2:1 in favour of females. Majority of these patients presented with burning micturition, Abdominal pain, Anorexia and frequency of micturition. Thirty Eight percent patients were diagnosed with DM for less than 5 years and rest had DM for more than 5 years. UTI was significantly more common in patients with BMI >25 ($p < 0.0001$) establishing obesity as a likely cause for UTI in diabetics. More than three fourth of patients UTI in our study had HbA1c Level more than 7.5 ($p < 0.0001$) making blood glucose level one of the most important prognostic indicator of UTI in diabetics. Gram Negative bacteria like E. Coli and Klebsiella were most commonly inoculated organism in urine analysis. **Conclusion** Diabetics are more prone to develop UTI which can complicate further due to high glucose levels in blood and urine. Good control of blood glucose with regular medications, proper diet and weight maintenance is essential for prevention of UTI in diabetics. Early diagnosis with blood / urine analysis and antibiotic coverage is necessary for timely recovery in high risk individuals.

KEYWORDS

Diabetes ,Urinary Tract Infection, Obesity, HbA1C

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterised by hyperglycemia resulting from defects in insulin secretion, insulin action or both.¹ The term urinary tract infection encompasses a variety of clinical entities, including asymptomatic bacteriuria (ASB), cystitis, prostatitis, and pyelonephritis. UTI occurs far more commonly in females than in males. The increased incidence of UTI in diabetic people may be caused by a number of distinct possible factors. Increased urine glucose levels may encourage the development of harmful microorganisms in the urinary tract. Different immune system dysfunctions, such as those affecting humoral, cellular, and innate immunity, may play a role in the etiology of UTI in diabetic individuals.² This study aims at evaluating risk factors in patients presented with urinary tract infection in case of diabetic mellitus to ensure early diagnosis by Clinical, Biochemical and Radiological profile. We also aimed to study the correlation of UTI with duration and type of diabetes mellitus and to determine the correlation between glycaemic control and UTI with diabetes mellitus.

MATERIALS AND METHODS

Following ethical clearance from institutional ethics committee, this cross sectional observational study was carried out on 250 diabetic patients admitted with urinary tract infection in medicine department of Tertiary Care Hospital in Ahmedabad over a period of 2 years from 1st December 2020 to 30th November 2022. Patients below the age of 14 years, those with recent urinary tract instrumentation, patients with use of antimicrobials during the last 14 days and patients who failed to provide informed consent were excluded from the study. Upon admission, detailed relevant history and clinical examination was done in study group according to predesigned and pretested proforma.

Patient's demographic, clinical history and detailed past history was recorded. All necessary blood investigations were done in form of CBC, Renal Function Test (RFT), Random Blood Sugar (RBS), Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and HbA1C. Moreover the patients were given sterile bottles to produce a "clean catch" mid-stream urine (the method was explained to them). This was sent to the microbiology laboratory of the hospital for urinalysis, microscopy, culture and sensitivity. For urine culturing, the dip slide inoculum method was used. The various color changes obtained upon analysis with this method were noted. Statistical analysis was done using appropriate statistical software.

RESULT AND OBSERVATION

Out of 250 diabetic patients 160 (64%) were females and 90 (36%) were males in study. The UTI in diabetic females was significantly more common ($p < 0.05$). The mean age of the study participants was 54 years. Majority of study group subjects belonged to age group between 46-60 years ($n=88$, 35.2%). Out of a total 250 diabetic patients 237 (94%) were having type 2 diabetes and 13 (6%) were having type 2 diabetes.

Out of 250 patients 38.8% patients diagnosed with diabetes for < 5 years of duration, 34.4% patients with diabetes between 5-10 years of duration and 26.8% patients with diabetes for >10 years. A longer duration of diabetes has been associated with increased risk for neuropathy³ but here we did not find significant association between UTI and duration of diabetes.

In present study group 2.4% patients had BMI <18.5, 23.6% patients had BMI 18.5-24.9, 27.6% patients had BMI 25-29.9, 31.6% patients having BMI between 30-34.9, 10.4% patients having BMI 35-35.9 and 4.4% patients with BMI >40. In comparative Analysis between pre-obese or obese (BMI >25) and non-obese individuals (BMI <25); Individuals with BMI >25 were at a higher risk of UTI ($p < 0.0001$). This could be due to their inability to exert sufficient pressure to empty the bladder.

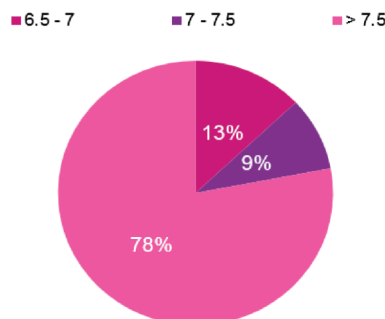


Fig 1 - HbA1c distribution in study population

Upon Analysis about 12.8% patients had HbA1c in range of 6.5 -7.0, 8.8% had HbA1c between 7.1-7.5 whereas 78% patients had HbA1c

more than 7.5. Individuals with poor HbA1c control (>7.5) were at a higher risk of UTI as compared to patients with poor HbA1c control. ($p < 0.0001$)

The most common presenting symptom of UTI in diabetics was Burning Micturition (43.6%) followed by Abdominal Pain (42.8%), Anorexia, frequent micturition and fever (27.6% each), vomiting (12.8%) and Hematuria (2%).

On urine microscopic analysis 44 % had proteinuria, 52% had glycosuria, 100% patients had pus cell and 23.6% had RBC in urine. In patients with urinary tract infection in diabetic 66.4% cultures positive for *Escherichia coli*, 2.4% cultures positive for *Acinetobacter*, 4.4% of the cultures positive for *Candida albicans*, 10.8% of the cultures positive for *Klebsiella* and 2.4% cultures were positive for *Pseudomonas*, 4.4% cultures positive for *staphylococcus*, 3.6% cultures positive for *proteus*, 9.2% cultures positive for *enterococcus*.

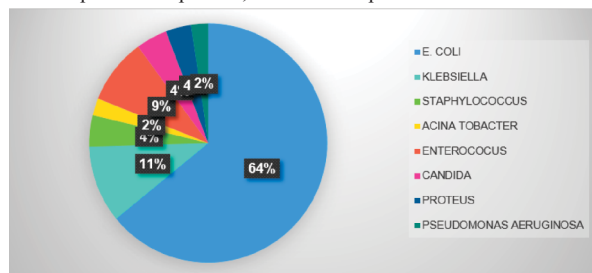


Fig 2 - Distribution microorganisms in diabetics with UTI

SUMMARY

Evidence suggests that urinary tract infection (UTI) is the most common bacterial infections among diabetic patients. The risk factors for development of UTI in diabetics include female sex, age, duration of diabetes, control of blood sugars as well as some medications such as SGLT 2 inhibitors. In our study Most of the diabetic patients with UTI had type 2 DM which is consistent with the high prevalence in our region. We did not observe a significant association between duration of diabetes and UTI in our study. This observation may be explained by the fact that many patients were diagnosed with diabetes only when they presented with UTI. Risk factors for development of UTI also include other co-morbidities such as obesity, peripheral and autonomic neuropathies, etc. In this study, 46.4% patients were obese ($p < 0.001$) which reinforces the previously established risk factors. We have documented high incidence of UTI in patients with HbA1c >7.5 ($p < 0.001$). This re-iterates the fact that control of blood glucose level might be the single most important factor for prevention of infections in diabetics. Most common presenting symptoms are burning micturition, abdominal pain and anorexia as diabetics may not always present with fever. As observed in many studies, E coli was the commonest organism isolated in our study followed by Klebsiella. Hence it is important to look for diabetes in patients of UTI and vice versa. This study also emphasis on the need of strict adherence to diet and medications as well as periodic investigations in patients of diabetes.

Limitations Of Study

This was a Single center study with a small sample size done at a tertiary care referral center. Hence the results might not be true representation of the population. A detailed cohort study with other influencing factors such as use of SGLT2 inhibitors should help in better understanding of UTIs in diabetics.

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